

**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application.

**Listing of Claims:**

1-3 (Canceled)

4. (Thrice amended) A biochip comprising:

a single planar array of individually driven exclusively current/voltage delivery microelectrodes, each adapted for connection to a single cell, wherein the location of the array of microelectrodes comprises an array region comprised on an insulating layer mounted on a solid semiconductor substrate;

means for electrically connecting said microelectrodes to a switching system, wherein each microelectrode is selectively driven by the switching system through a waveform signal with a programmed shape and timing;

a cell culture chamber where cells can be grown and adhere in contact with said array of microelectrodes on a surface formed by said insulating layer containing said array of microelectrodes on said solid substrate; and,

two ground reference electrodes integrated in the semiconductor substrate covered with the insulating layer, wherein the ground reference electrodes are in a planar orientation with the array of microelectrodes, and wherein the ground reference electrodes are positioned outside the array region.

5. (Previously presented) The biochip according to claim 4 comprising a semiconductor substrate as the solid substrate covered with an insulating layer comprising said array of individually driven microelectrodes of a size comparable to the cell to be electroporated, and mounting a cell culture chamber with an opening mounted, in turn, on a support made of dielectric material, said microelectrodes being electrically connected via conductive traces to conductive pads electrically connected, in turn, to a pair of external parallel connectors through wire bonding covered by an outer portion of the cell culture chamber encircling the opening, being said cell culture chamber with the opening mounted over the top of said

semiconductor substrate covered with the insulating layer, both attached on the dielectric support.

6. Canceled.

7. (Previously presented) A biochip according to claim 5 wherein the semiconductor substrate covered with the insulating layer is a silicon substrate covered with an insulating layer preferentially of  $\text{SiO}_2$ .

8. (Previously presented) The biochip according to claim 5 wherein the solid substrate is transparent.

9. (Previously presented) The biochip according to claim 5 wherein the dielectric support is vetromite, glass or ceramic.

10. (Previously presented) The biochip according to claim 5 wherein the microelectrodes of the array have a size with a surface of at least ten per cent of the total cell membrane and preferably a diameter ranging from 1  $\mu\text{m}$  to 50  $\mu\text{m}$ .

11. (Previously presented) The biochip according to claim 4 wherein the microelectrodes are of conductive or capacitive type.

12. (Previously presented) The biochip according to claim 11 comprising conductive microelectrodes obtained over a silicon substrate covered with an insulating layer preferentially of  $\text{SiO}_2$ , said microelectrodes having connecting traces wherein said microelectrodes and their connecting traces being made by a "sandwich" of two titanium nitride, TiN, layers and an aluminium layer, covered with a gold layer on their active surface.

13. (Previously presented) The biochip according to claim 11 wherein said microelectrodes are realized using Metal Oxide Semiconductor, MOS, technology.

14. (Currently amended) The biochip according to claim 13 comprising a silicon p-

type substrate in which two n-doped regions, a drain and a source, are implanted with conventional microelectronic techniques, the microelectrodes further comprising a gate, wherein the gate of these electrodes is n+ doped polysilicon and common to all devices in a row or word line, the drain of all devices in a column being connected together by using a metal contact plug and a metal line, the source of the resulting transistor being connected via a metal, usually tungsten, plug to a gold layer which acts as the active electrode.

15. (Previously presented) The biochip according to claim 11 wherein the microelectrodes consist of a capacitive microelectrode obtained with an insulating substrate, a metal and a thin insulating layer said microelectrodes being separated by insulating material and covered in non exposed areas by a passivation layer.

16-26 (Canceled)

27. (New) The biochip according to claim 4 wherein the microelectrodes consist of a capacitive microelectrode obtained with an insulating substrate, a metal and a thin insulating layer, said microelectrodes being separated by insulating material and covered in non-exposed areas by a passivation layer.